

# The Effectiveness of a Psychological Guidance Rehabilitative Program Accompanied by EMG Technology for the Adductor Muscles of the Thighs on Muscular Strength and Emotional Arousal in Injured Football Players

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## Abstract

The Effectiveness of a Psychological Counseling and Rehabilitation Program Combined with EMG Technique for the Adductor Muscles of the Thighs on Muscle Strength and Emotional Arousal in Injured Football Players

The research aimed to develop a psychological counseling and rehabilitation program combined with EMG technique for improving muscle strength and emotional arousal in injured football players. The researcher used the experimental method in applying the research procedures to the sample, as it is the most suitable method for addressing the research problem. Research Population and Sample: The research population consisted of injured players from Baghdad football clubs in the Premier League. The research sample was selected purposively and initially comprised (14) players. Six players were excluded from this sample due to their participation in the pilot study, resulting in a sample of (18) injured players, representing 60% of the research population of (20) players. These players were randomly divided into two groups of (6) players each. The researcher employed procedures for determining anthropometric measurements, administering a pre-test, developing a psychological rehabilitation program, and conducting a post-test. The researcher utilized statistical analysis to arrive at the results, which included the statistically significant effectiveness of the psychological rehabilitation program combined with EMG technology for the first experimental group that implemented the program. Furthermore, the use of EMG technology in muscle strength and emotional arousal was also found to be beneficial. Among the most important recommendations is enhancing the interaction between psychological rehabilitation programs and EMG technology by integrating focused psychological counseling sessions with immediate biometric feedback from EMG during the sessions. Praise.

**Keywords:** Guidance program, psychological rehabilitation, EMG technique, emotional stimulation

## 1. Identification of the Research

### 1-1 Introduction and Importance of the Research:

Psychological counseling programs are considered an essential part of players' preparation, as they contribute to enhancing overall performance and player well-being, and to developing both motor and mental performance quality. These programs help build mental discipline, enhance self-confidence, and strengthen internal motivation, in addition to developing strategies for coping with pressure and stress during major matches. They also enhance concentration, manage anxiety, and facilitate effective communication between players and the technical staff, support team spirit and cooperation within the team, and provide tools for setting realistic goals and continuous monitoring of individual and collective development. In addition, the anterior thigh muscles with four heads contribute to producing the force required for all sporting activities, especially in football, which requires strong interception and rapid changes in body position. Injuries are considered a major obstacle that threatens physical and skill levels and limits the ability to train and compete. In this context, the importance of EMG technology emerges as a therapeutic tool that enhances recovery and the restoration of muscle function and neuromuscular coordination, with the necessity of linking this to its psychological aspects and their impact on morale and motivation. The research gains importance when it integrates the psychological counseling rehabilitative program with physical therapy methods and EMG

technologies, to investigate its effect on muscular strength, neuromotor stability, and emotional balance in injured players.

### **1–2 Research Problem:**

Current evidence indicates the effectiveness of psychological rehabilitative counseling programs and motor rehabilitation programs based on EMG technologies in enhancing functional strength and neuromotor coordination in injured players. However, an important gap emerges in the absence of practical and well-integrated incorporation between EMG technology and a comprehensive psychological counseling rehabilitative program specifically designed for the adductor muscles of the thighs in the context of football. Notably, there is a lack of studies that measure the effect of this approach on specific neuromotor and psychological variables such as cortical core stability, motor balance, and the reduction of injury-related anxiety. In addition, long-term follow-up data and post-return-to-competition performance evaluation remain limited and lack sufficient evidence regarding sustainability and long-term impact.

### **1–3 Research Objectives:**

1. Preparing a psychological counseling rehabilitative program accompanied by EMG technology for muscular strength and emotional arousal in injured football players.
2. Identifying the effectiveness of the psychological counseling rehabilitative program accompanied by EMG technology on muscular strength and emotional arousal in injured football players.
3. Identifying the effectiveness of the psychological counseling rehabilitative program on muscular strength and emotional arousal.

### **1–4 Research Hypotheses:**

1. There are differences between the results of the pre-tests and post-tests in muscular strength for the two experimental groups.
2. There are differences between the results of the pre-tests and post-tests in emotional arousal for the two experimental groups.
3. There are differences between the two experimental groups in the post-tests of the muscular variables and emotional arousal.

### **1–5 Research Scope:**

#### **1–5–1 Human Scope:**

(12) injured players from Baghdad Premier Division clubs.

#### **1–5–2 Temporal Scope:**

For the period from 8/12/2024 to 10/6/2025.

#### **1–5–3 Spatial Scope:**

- Outdoor fields of Al-Naft Sports Club – Baghdad.
- Physical fitness hall at Al-Naft Sports Club – Baghdad.
- Weightlifting hall at Al-Naft Sports Club – Baghdad.
- Al-Alamiyah Private Hospital – Department of Nerve and Muscle Electromyography.

### **3– Research Methodology and Field Procedures:**

#### **3–1 Research Method:**

The researcher used the experimental method in applying the research procedures to the sample, as it is the most appropriate method for solving the research problem.

#### **3–2 Research Population and Sample:**

The research population consisted of injured football players from Baghdad clubs / Premier Division. The research sample was selected using the purposive method and consisted of (14) players. (Six players) were excluded due to their participation in the pilot study procedures. Accordingly, the number of research sample members reached (18) injured players, representing 60% of the research population, which consists of (20) players. They were divided by lottery into two groups, with (6) players for each group.

- **The first group:** (6) injured players working according to the psychological counseling rehabilitative program and EMG technology.
- **The second group:** (6) players working only with the psychological counseling rehabilitative program.
- **3–2–1 Homogeneity of the Research Sample:**

- Table (1) shows the homogeneity of the research sample in anthropometric measurements and injury age.

Variables	Total Sample Size	Number of Groups	Arithmetic Mean	Median	Standard Deviation	Skewness Coefficient
Height (cm)	12	2	169.50	169	4.927	0.744
Weight (kg)			74.08	74	3.801	-0.315
Age (years)			24.83	24.5	1.467	-0.73
Injury Age (months)			7.58	7	1.676	0.938

- It is noted from Table (1) that the values of the skewness coefficient are all confined within (+3), which indicates the homogeneity of the research sample in the variables referred to in the table, and that they fall within the normal distribution curve.
- 3–2–2 Equivalence of the Research Sample:**

Table (2) shows the arithmetic means, standard deviations, the calculated and tabulated (t) values, and the level of significance between the pre-tests of the two experimental research groups in the tests, measurements, and scales of the research.

Variables	Unit of Measurement	First Experimental Group Psychological Counseling Rehabilitative Program + EMG Technology	Second Experimental Group Psychological Counseling Rehabilitative Program	Calculated (t)	Degree of Significance	Significance
		<b>n</b>	<b>Mean</b>	<b>SD</b>	<b>n</b>	<b>Mean</b>
<b>Muscular Strength</b>	<b>kg</b>	<b>6</b>	<b>39.1667</b>	<b>5.84523</b>	<b>6</b>	<b>36.666</b>
<b>Emotional Arousal</b>	<b>Score</b>	<b>6</b>	<b>108.17</b>	<b>5.636</b>	<b>6</b>	<b>105.5</b>

- Degree of freedom (n-2) = 10      Level of significance (0.05)

It is evident from Table (2) that the (t) values were not significant when compared with the value of the level of significance, as they were greater than (0.05), which indicates that there are no significant differences between the two groups in the results of the pre-tests, and that they are equivalent and at the same starting line.

### 3–3 Means of Data Collection:

- Arabic and foreign sources.
- The global information network (Internet).
- Personal interviews with experts and specialists.
- Observation and analysis.
- Assisting work team.
- A form for recording the items of the guidance sessions used.

### 3–4 Devices and Tools Used in the Research:

- A laptop computer (Laptop), type (DELL), Chinese-made.
- EMG muscle activity measurement device (EMG).
- EMG technology device, Chinese-made.
- Medical balls.
- Anthropometric tape for measuring thigh circumference.
- EMG signal electrodes (sensors).
- Laser discs.
- Electrical electrodes (surface) specific to EMG technology.
- Iron discs of different weights.
- Iron bar (shaft).
- Benches for performing some exercises.

### **3–5 Research Procedures:**

The researcher carried out several scientific administrative procedures related to the requirements of the research, including preparing all devices, tools, and means of transportation that enable the athlete to deal with the research procedures with motivation and cooperation, and to endure the period of diagnosis and treatment (rehabilitation and EMG technology), as well as pre- and post-EMG muscle recording.

### **3–6 Measurements and Tests Used in the Research:**

#### **Measurements Used:**

##### **Body Weight Measurement:**

Purpose: Measuring weight.

Description: The subject stands barefoot on the base of the medical scale; the player wears shorts and a T-shirt. The value displayed on the screen is recorded in kilograms.

##### **Stature (Height) Measurement:**

Purpose: Determining height.

Description: The player stands upright beside a ruler fixed to the wall, and the value is recorded in centimeters.

### **3–7 Test of Thigh Muscle Strength Using the Leg Curl Machine<sup>1</sup>**

### **3–8 Emotional Arousal<sup>2</sup>**

### **3–9 Scientific Bases of the Test:**

The researcher relied on several standardized scientific scales and tests that were applied to the Iraqi environment in recent years and at a level comparable to the research sample.

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<sup>1</sup> Zaid Karim Ajil; *The Effect of a Rehabilitative Program Accompanied by Electrical Stimulation for the Anterior Thigh Muscles Injured by Tearing among Football Club Players in Al-Anbar Governorate*, published research, *Journal of Sports Sciences*, special issue of the First Scientific Conference, Volume 18, Issue 1, 2019, p. 232.

<sup>2</sup> Zina Khalid Jasim and Ilham Ali Hassoun; *Emotional Arousal and Its Relationship with Performance in Some Hoop Skills in Rhythmic Gymnastics*, published research, *Al-Mustansiriyah Journal of Sports Sciences*, Volume 2, Issue 3-1, 2020, p. 109.

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### **3–10 The Main Experiment:**

The design is based on integrating psychological counseling exercises with EMG interventions in the adductor muscles of the thighs, in order to investigate the effect of this integration on functional improvement, sports recovery, and psychological adaptation during injury periods.

#### **The neuromotor aspect:**

Neuromotor stability and motor coordination are evaluated through recording EMG signals from the adductor muscles of the thighs during convergence and motor coordination exercises. The program aims to enhance neuromuscular coordination and reduce non-unified emotional arousal, which is reflected in movement accuracy and the sustainability of strength during return to matches.

#### **The psychological aspect:**

The program includes components such as attention control, management of injury-related anxiety, enhancement of self-confidence, and strengthening of self-motivation. Relaxation techniques, positive imagery, and realistic goal setting are used to reduce anxiety and improve mental performance during training and competition.

#### **Psychological rehabilitative counseling:**

The counseling pathway is based on periodic assessments of psychological and physical variables, with follow-up of EMG outputs and examination of motor outcomes. The program provides tools to enhance the player's adherence to the rehabilitation plan and improve the quality of communication with the technical staff.

### **3–11 Pre-tests:**

The pre-tests were conducted on Thursday, 28/2/2025, on a sample consisting of 12 injured players, distributed into two experimental groups (6 players for each group). The measurements included: body weight, stature (height), and the muscular strength test using the leg curl machine for the injured leg, and emotional arousal. The tests continued until 4/3/2025.

### **3–12 Psychological Rehabilitative Counseling Program:**

The researcher followed scientific steps to build a psychological rehabilitative counseling program accompanied by EMG technology for the adductor muscles of the thighs in injured football players:

#### **1) Defining Goals and Measurement Determinants:**

- Establish clear objectives that measure functional performance, neuromotor stability, and psychological improvement.
- Select variables of muscular motor strength (movement techniques and accuracy) and emotional arousal.

#### **2) Designing the Methodology of Integrating EMG with Psychological Counseling:**

- Integrate EMG mechanistic sessions with guided suggestion and psychological interventions.
- Establish simultaneous operational protocols: motor exercises with EMG feedback and cognitive-behavioral training.

### 3) Selecting Evaluation and Measurement Procedures:

- Determine pre- and post-tests, with a control group if possible.
- Select EMG metrics (peak, area, time), motor strength and accuracy measures, and reliable psychological indicators.

### 4) Preparing the Psychological Training Content:

- Train attention, manage injury-related anxiety, enhance self-confidence and motivation.
- Apply relaxation techniques, positive imagery, and realistic goal setting, with continuous monitoring of progress.

### 5) Implementing and Fixing EMG Protocols:

- Set guidelines for electrode placement, maintaining hygiene and comfort, and documenting care of the feedback.
- Train players to interpret EMG signals and use the feedback to adjust performance.

### 6) Documentation, Analysis, and Continuous Implementation:

- Record data regularly and update in periodic reports.
- Analyze data pre- and post-intervention and modify the program based on results and feedback from players and coaches.

The researcher also defined some key points for program implementation:

#### The required four observations:

1. A psychological rehabilitative counseling program accompanied by EMG technology was implemented for 12 weeks, starting from 5/3/2025, with three rehabilitative units per week and three daily EMG electrical stimulation sessions, followed by one rest day.
2. The total rehabilitative units were 36 units, and the total EMG sessions were 36 sessions. Each rehabilitative unit lasted 40 minutes, with intensity ranging from 30% to 60% of the injured player's capacity, with gradual progression to prevent fatigue.
3. Injuries were in the right leg, with minor tears in the adductor muscles of the thigh, applying the principle of progression from easy to difficult and gradually increasing repetitions according to intensity.
4. The goal was to improve the effectiveness of the adductor muscles through a gradual sequence of exercises and EMG feedback, supported by psychological rehabilitation.

#### 3–13 Post-tests:

The researcher conducted the leg curl test for the research sample in the first and second experimental groups on 7/6/2025 at 2:00 PM, in the motor fitness hall at Al-Naft Sports Club. The researcher ensured that conditions matched the pre-tests in terms of timing, location, duration, and use of the same tools. Data were documented in the designated registration form for that day, in the presence of the assisting work team.

On 9/6/2025, the EMG mapping test for the muscles was conducted at Al-Alamiyah Private Hospital – Department of Muscle Mapping, under the supervision of Dr. Aqeel Karim Al-Husseini, the specialist physician, in the presence of the work team and investigators outside the research sample, with supervision and follow-up from the investigators and assisting teams.

Additionally, the data regarding emotional arousal were recorded and the results were documented in separate forms for each test and compared with the pre-test results after applying appropriate statistical treatments according to the nature of the research variables. These procedures aimed to extract final results with high accuracy and reliability.

### 3–15 Statistical Methods:

The researcher used the Statistical Package for the Social Sciences (SPSS).

### 4– Presentation, Analysis, and Discussion of Research Results:

After conducting the tests, measurements, and applying the scales, the researcher processed the results statistically to achieve the objectives of the research and to verify the formulated hypotheses. The following presents the results and statistical tables, followed by a discussion of the statistical treatments presented in the tables, supported by references to clarify the reasons that led to them.

#### 4–1–1 Presentation, Analysis, and Discussion of the Pre-test and Post-test Results of Muscular Strength for the First and Second Experimental Groups:

The researcher presents the results of the arithmetic means and standard deviations for the pre-tests and post-tests of the research groups in the muscular strength test using the paired samples (t) test and analyzes them, as shown in Table (3).

**Table (3) shows the arithmetic means, standard deviations, mean differences, differences' standard deviations, the calculated and tabulated (t) values, and the significance between the pre-test and post-test for the research groups in the muscular strength test results.**

Test	First Experimental Group	Second Experimental Group	Calculated (t)	Degree of Significance	Significance
	Mean	SD		SD	
Muscular Strength	69.166	8.0104	45.833	5.8452	5.764

**Unit of measurement:** kg

**Degrees of freedom (n–1):** 5

**Level of significance:** 0.05

**Tabulated (t) value:** 2.571

#### 4–1–2 Presentation, Analysis, and Discussion of Post-test Results of Muscular Strength Between the Research Groups (First and Second Experimental Groups):

To determine which of the research groups performed better in the muscular strength test, the researcher conducted an independent samples (t) test for the two groups, as shown in Table (4).

**Table (4) shows the arithmetic means, standard deviations, the differences (Δ), standard deviations of differences, calculated and tabulated (t) values, and significance level between the post-tests of the first and second experimental research groups in the muscular strength test results.**

Group	Pre-test Mean (S)	Pre-test SD (+SD)	Post-test Mean (S)	Post-test SD (+SD)	Mean Difference ( $\Delta$ )	SD of Difference ( $\Delta$ SD)	Calculated (t)	Degree of Significance	Significance
First Experimental Group Psychological Counseling Rehabilitative Program + EMG Technology	39.166	5.8452	69.166	8.0104	30.000	11.832	6.211	0.002	Significant
Second Experimental Group Psychological Counseling Rehabilitative Program	36.666	6.0553	45.833	5.8452	9.166	2.0412	11.000	0.000	Significant

Measuring units: kg

Degrees of freedom (n-2): 10

Level of significance: 0.05

Tabulated (t) value: 2.228

#### 4–1–3 Discussion of the Muscular Strength Test Results for the First and Second Experimental Groups:

Reviewing Tables (3) and (4) shows that both experimental groups improved between the pre-test and post-test, and the first experimental group outperformed the second experimental group in the post-test.

The researcher attributes these results, which showed the superiority of the first group that used the Psychological Counseling Rehabilitative Program + EMG Technology over the second group that used only the Psychological Counseling Rehabilitative Program, to the use of EMG technology. EMG demonstrated a clear effectiveness in increasing muscular strength, as “EMG technology is one of the therapeutic methods used in the rehabilitation and restoration of the efficiency of muscles affected by muscular atrophy<sup>3</sup>,” which works to develop the strength of the injured thigh muscles.

The researcher also attributes the improvement in this test’s results to the participants of the first experimental group who applied the Psychological Counseling Rehabilitative Program fully and accurately, as well as to the effectiveness of the psychological counseling used by the researcher, in addition to the effectiveness of EMG technology in developing muscular strength.

<sup>3</sup> Diaan Al-Din Bara’ Jawad & Bukbus Muhammad Amin; *The Effect of a Proposed Program for Rehabilitating the Adductor Muscles of the Thigh in Iraqi League Football Club Players*, published research, *Scientific and Technological Journal of Physical and Sports Activities*, University of Mostaganem, Algeria, Volume 16, Issue 1, 2019, p. 34.

“Designing the psychological counseling sessions according to correct scientific principles in terms of volume, intensity, and gradual progression, as well as the inter-session rest, positively reflected on the development of muscular strength.”<sup>4</sup>

Bushra Kazem notes that the EMG technique is considered one of the EMG excitation methods, which works to activate muscle contraction with the aim of increasing muscle strength. From this, it is clear that the EMG technique used does not lead to muscle hypertrophy, although it is one of the methods for developing strength.<sup>5</sup>

#### 4–2 Presentation, Analysis, and Discussion of Pre-test and Post-test Results for the Research Groups on the Emotional Arousal Scale:

##### 4–2–1 Presentation, Analysis, and Discussion of Pre-test and Post-test Results for the Research Groups on the Emotional Arousal Scale:

The researcher presents the pre-test and post-test results for the research groups on the emotional arousal scale and analyzes them, as shown in Table (5).

**Table (5) – Pre-test and Post-test Results for Emotional Arousal Scale for Both Research Groups**

Group	Pre-test Mean (S)	Pre-test SD (+SD)	Post-test Mean (S)	Post-test SD (+SD)	Mean Difference (Δ)	SD of Difference (ΔSD)	Calculated (t)	Degree of Significance	Significance
First experimental Group	108.017	5.636	74	4.733	34.167	4.708	17.776	0.000	Significant
Second experimental Group	105.5	6.535	86.17	2.483	19.333	6.623	7.150	0.001	Significant

Unit of measurement: degree

Degrees of freedom (n–1): 5

Level of significance: 0.05

Tabulated (t) value: 2.571

##### 4–2–2 Presentation, Analysis, and Discussion of Post-test Results Between the Research Groups (First and Second Experimental Groups) on the Emotional Arousal Scale:

To determine which of the research groups had lower arousal (irritability), the researcher conducted an independent samples (t) test for the two groups, as shown in Table (6).

<sup>4</sup> Amer Saeed Al-Khaikani; *The Psychology of Football*, 1st edition, University of Babylon, College of Physical Education, 2011, p. 54.

<sup>5</sup> Bushra Kazem Abdulreda Al-Amashi; *The Effect of Electrical Stimulation in Developing Explosive Strength and Performing the Double Backward Tucked Somersault Skill According to Some Biokinematic Variables*, Doctoral Thesis, University of Baghdad, 2005, p. 45.

**Table (6) – Post-test Results Between the First and Second Experimental Groups on the Emotional Arousal Scale**

Measure	First Experimental Group	Second Experimental Group	Calculated (t)	Degree of Significance	Significance
	n	Mean (S)	SD (+SD)	n	Mean (S)
Emotional Arousal	6	74	4.733	6	86.17

Unit of measurement: degree

Degrees of freedom (n–2): 10

Level of significance: 0.05

Tabulated (t) value: 2.228

#### **4–2–3 Discussion of Pre-test and Post-test Results and Post-test Comparison Between Groups on the Emotional Arousal Scale:**

Reviewing Tables (5) and (6) shows a significant difference between the pre-test and post-test for both groups, with the first experimental group outperforming the second experimental group in the post-test.

The researcher attributes these results to the type of guided sessions used in the Psychological Counseling Rehabilitative Program applied to the research sample. This program included multiple exercises, such as stretching the adductor muscles of the thighs as well as other muscles involved in hip adduction and abduction movements, which are performed with active muscular work.

In addition, the use of the EMG technique contributed to the development of muscular strength within the framework of fixed muscular work. This improvement in the muscular system has a significant impact on enhancing neuromuscular coordination, the player's sense of comfort, and physiological adaptation in their functional muscular and nervous systems, which positively affected the psychological state.<sup>6</sup>

Consequently, this led to improved emotional arousal (irritability) as a result of reduced psychological stress. Furthermore, "psychological state greatly affects an individual's ability to produce more muscular strength; an injured athlete who undergoes well-structured rehabilitative programs appears in a good psychological state, with the development of positive emotional arousal that contributes to optimal muscle strength production."<sup>7</sup>

## **5 – Conclusions and Recommendations**

### **5-1 Conclusions:**

Considering the results discussed by the researcher, the following conclusions were drawn:

<sup>6</sup> Nada Abdul-Salam Sabri Saeed; *The Effect of Electrical Stimulation and Therapeutic Exercises on the Response of Muscles Acting on the Injured Knee Joint*, Master's Thesis, University of Baghdad, College of Physical Education, 2000, p. 48.

<sup>7</sup> Zainab Abdulmir Owaed & Maha Sabri Hassan; *Effectiveness of a Psychological Counseling Program in Improving Self-Control of Female Students at the College of Physical Education and Sports Sciences, University of Kirkuk*, published research, *Journal of Sports Sciences*, Volume 16, Issue 59, 2025, p. 149.

1. The Psychological Counseling Rehabilitative Program accompanied by EMG technology contributed **significantly and meaningfully** to the first experimental group, which applied the program along with EMG technology, in terms of **muscular strength and emotional arousal**.
2. Emotional arousal improved because of the improvement in muscular strength among injured players, due to the **functional adaptation of the adductor muscles of the thighs** at neurological, muscular, and psychological levels.

#### 5-2 Recommendations:

1. **Enhance the integration between psychological rehabilitation programs and EMG technology** by combining focused psychological counseling sessions with immediate biomechanical feedback from EMG during the rehabilitation sessions.
2. **Enhance sensory awareness and neural control over the thigh adductor muscles**, which reduces excessive emotional arousal during the return to competition.
3. **Adopt anxiety management and focus strategies**, such as guided breathing, positive visualization, and step-by-step realistic goal setting, with periodic psychological assessments to measure improvement in emotional arousal, linking it to improvements in muscular strength measured via EMG.
4. **Facilitate the transition to athletic performance** through designing progressive rehabilitation protocols that link EMG exercises to muscle strength and technical playing skills, involving the coach and medical team in monitoring progress to ensure continued improvement in strength and emotional stability during return to matches.

#### Sources:

- Bushra Kazem Abdulreda Al-Amashi; *The Effect of Electrical Stimulation in Developing Explosive Strength and Performing the Double Backward Tucked Somersault Skill According to Some Biokinematic Variables*, Doctoral Thesis, University of Baghdad, 2005.
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